SEA-DOO 2003

Shop Manual

GTI™/LE/LE RFI,
GTX† DI,
XP™ DI,
RX™ DI,
LRV™ DI,
GTX† 4-TEC™ series

BOMBARDIER

219 100 160

2003
Shop Manual

GTI, GTI LE, GTI LE RFI, GTX DI,
XP DI, RX DI, LRV DI, GTX 4-TEC SERIES

BOMBARDIER
RECREATIONAL PRODUCTS

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BOMBARDIER-ROTAX Injection Oil

Sea-Doo Synthetic Grease

Sea-Doo LK™

DESS™

Rotax®

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TOPS™

TABLE OF CONTENTS

SECTION		SUBSECTION	PAGE
SAFETY NOTICE			III
INTRODUCTION			IV
01	SERVICE TOOLS AND PRODUCTS	01 - Table of contents	01-01-1
		02 - Mandatory service tools	01-02-1
		03 - Optional service tools	01-03-1
		04 - Service products	01-04-1
02	MAINTENANCE	01 - Table of contents	02-01-1
		02 - Periodic inspection chart	02-02-1
		03 - Flushing and lubrication	02-03-1
		04 - Water-flooded engine	02-04-1
		05 - Storage	02-05-1
03	TROUBLESHOOTING	01 - Troubleshooting chart	03-01-1
04	ENGINE (2-stroke)	01 - Table of contents	04-01-1
		02 - Leak test	04-02-1
		03 - Removal and installation	04-03-1
		04 - Magneto system	04-04-1
		05 - Top end	04-05-1
		06 - Bottom end	04-06-1
		07 - Rotary valve	04-07-1
		08 - Exhaust system	04-08-1
05	ENGINE (4-TEC)	01 - Table of contents	05-01-1
		02 - Leak test	05-02-1
		03 - Intake system	05-03-1
		04 - Exhaust system	05-04-1
		05 - Removal and installation	05-05-1
		06 - PTO housing/magneto	05-06-1
		07 - Lubrication system	05-07-1
		08 - Cylinder head and valves	05-08-1
		09 - Engine block	05-09-1
06	ENGINE MANAGEMENT (RFI)	01 - Table of contents	06-01-1
		02 - Overview	06-02-1
		03 - Diagnostic procedures	06-03-1
		04 - Component inspection	06-04-1
		05 - Troubleshooting summary	06-05-1
		06 - Adjustment	06-06-1
		07 - Removal and installation	06-07-1
07	ENGINE MANAGEMENT (DI)	01 - Table of contents	07-01-1
		02 - Overview	07-02-1
		03 - Component inspection and adjustment	07-03-1
		04 - Diagnostic procedures	07-04-1
08	ENGINE MANAGEMENT (4-TEC)	01 - Table of contents	08-01-1
		02 - Overview	08-02-1
		03 - Component inspection and adjustment	08-03-1
		04 - Diagnostic procedures	08-04-1
09	COOLING SYSTEM	01 - Table of contents	09-01-1
		02 - Circuit, components and care	09-02-1

TABLE OF CONTENTS

SECTION		SUBSECTION	PAGE
10	FUEL SYSTEM	01 - Table of contents	10-01-1
		02 - Fuel circuit	10-02-1
		03 - Air intake (2-stroke)	10-03-1
		04 - Carburetor	10-04-1
11	LUBRICATION SYSTEM (2-stroke)	01 - Table of contents	11-01-1
		02 - Oil injection system	11-02-1
		03 - Oil injection pump	11-03-1
12	ELECTRICAL SYSTEM	01 - Table of contents	12-01-1
		02 - Ignition system (carbureted engines)	12-02-1
		03 - Charging system	12-03-1
		04 - Starting system	12-04-1
		05 - Instruments and accessories	12-05-1
		06 - DESS (carbureted and RFI engines)	12-06-1
13	PROPULSION SYSTEM	01 - Table of contents	13-01-1
		02 - Jet pump	13-02-1
		03 - Drive system	13-03-1
		04 - Reverse system	13-04-1
		05 - Variable trim system	13-05-1
14	STEERING SYSTEM	01 - Table of contents	14-01-1
		02 - Steering system	14-02-1
		03 - Alignment	14-03-1
15	SUSPENSION	01 - Table of contents	15-01-1
		02 - Direct action suspension	15-02-1
16	HULL/BODY	01 - Table of contents	16-01-1
		02 - Adjustment and repair	16-02-1
17	TECHNICAL DATA	01 - GTI and GTI LE models	17-01-1
		02 - GTI LE RFI models	17-02-1
		03 - GTX DI, RX DI and XP DI models	17-03-1
		04 - LRV DI models	17-04-1
		05 - GTX 4-TEC models	17-05-1
18	WIRING DIAGRAMS	01 - Wiring diagrams	18-01-1

SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair all 2003 SEA-DOO watercraft. See model list below.

This edition was primarily published to be used by watercraft mechanical technicians who are already familiar with all service procedures relating to Bombardier made watercraft. Mechanical technicians should attend training courses given by Bombardier Training Dept.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual* uses technical terms which may be slightly different from the ones used in the *Parts Catalog*.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the English version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at time of writing. *Service* and *Warranty Bulletins* may be published to update the content of this manual. Make sure to read and understand these.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, self-locking fasteners, etc.) must be installed or replaced with new ones. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols:

⚠ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

CAUTION: **Denotes an instruction which, if not followed, could severely damage vehicle components.**

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

INTRODUCTION

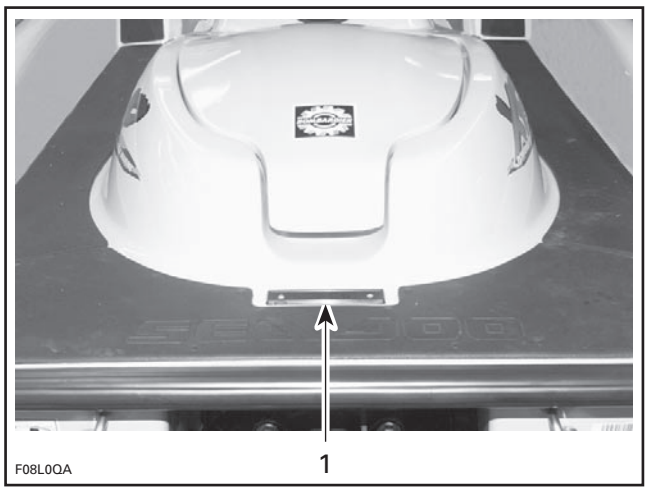
This *Shop Manual* covers the following BOMBARDIER made SEA-DOO® 2003 watercraft models.

MODELS	ENGINE TYPE	MODEL NUMBER
XP DI	947 DI	6131
XP DI International	947 DI	6130
GTI (blue) International	717	5568
GTI (ultraviolet)	717	5598
GTI California (ultraviolet)	717	5567
GTI International (ultraviolet)	717	5597
GTI LE (earthen clay)	717	6102
GTI LE International (earthen clay)	717	6101
GTI LE RFI	787 RFI	6104
GTI LE RFI International	787 RFI	6103
GTX DI	947 DI	6119
GTX DI International	947 DI	6118
RX DI	947 DI	6123
RX DI International	947 DI	6122
LRV DI	947 DI	5771
GTX 4-TEC	1503	6112
GTX 4-TEC International	1503	6111
GTX 4-TEC Vans Triple Crown Edition	1503	6126
GTX 4-TEC Vans Triple Crown Edition International	1503	6125
GTX 4-TEC Supercharged (viper red)	1503	6129
GTX 4-TEC Supercharged International (viper red)	1503	6128
GTX 4-TEC Supercharged (yellow)	1503	6106
GTX 4-TEC Supercharged International (yellow)	1503	6105
GTX 4-TEC Supercharged Limited	1503	6108
GTX 4-TEC Supercharged Limited International	1503	6107

HULL IDENTIFICATION NUMBER (H.I.N.)

It is located on footboard at the rear of watercraft.

1. Hull Identification Number (H.I.N.)

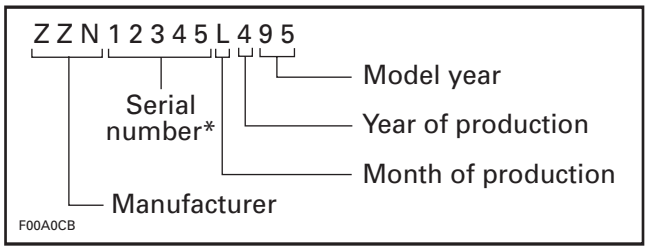


TYPICAL

1. Hull Identification Number (H.I.N.)

All Models

The Hull Identification Number is composed of 12 digits:

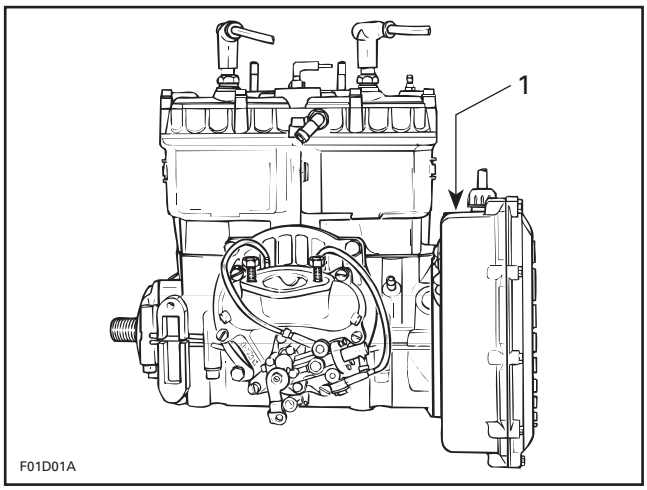


*A letter may also be used as a digit.

ENGINE IDENTIFICATION NUMBER (E.I.N.)

717 Engines

The Engine Identification Number is located on the upper side of the magneto housing.

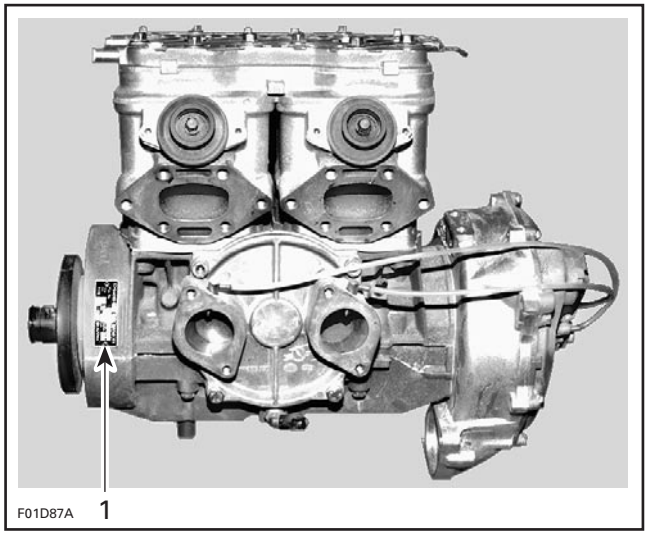


TYPICAL

1. Engine Identification Number (E.I.N.)

787 RFI Engines

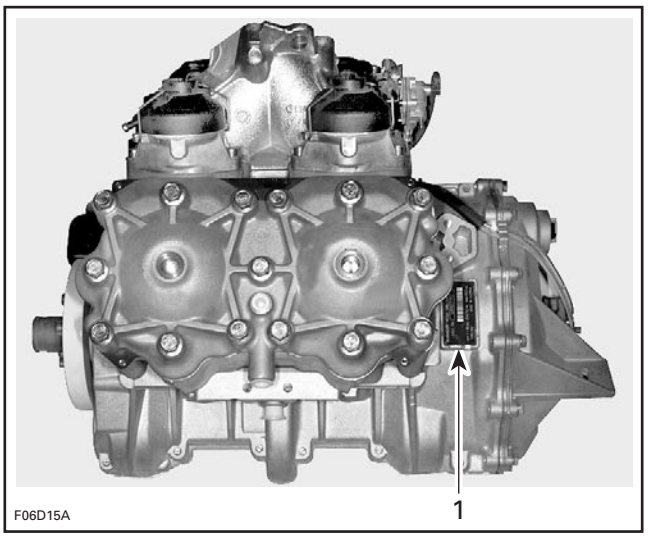
The Engine Identification Number is located on the upper crankcase on PTO side.



1. Engine Identification Number (E.I.N.)

947 DI Engines

The Engine Identification Number is located on the upper crankcase on MAGNETO side.



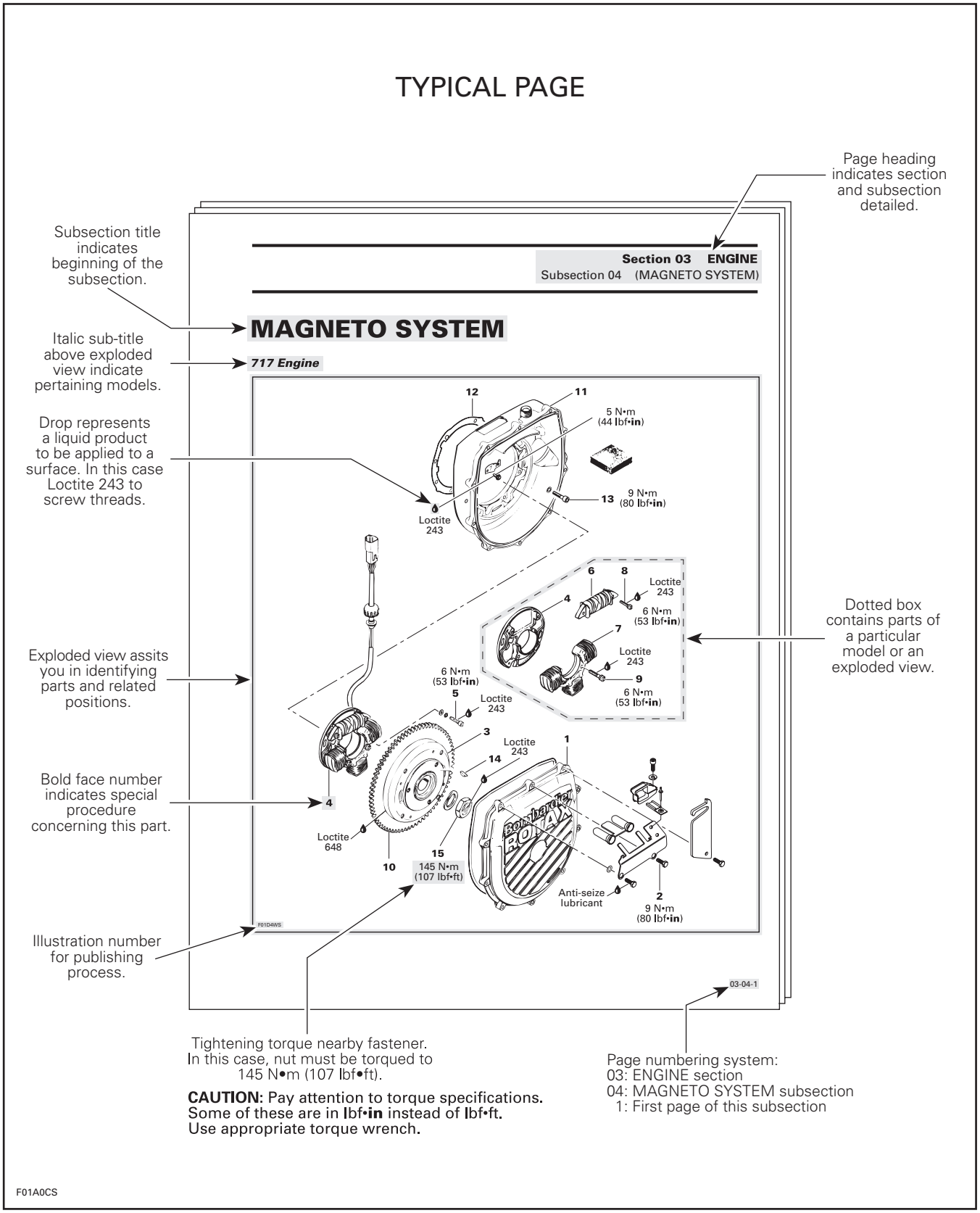
1. Engine Identification Number (E.I.N.)

ARRANGEMENT OF THIS MANUAL

The manual is divided into many major sections as you can see in the main table of contents at the beginning of the manual.

Several sections are divided in various subsections. There is a table of contents at the beginning of many sections.

TYPICAL PAGE


Page heading indicates section and subsection detailed.
Subsection title indicates beginning of the subsection.
Section 03 ENGINE
Subsection 04 (MAGNETO SYSTEM)
MAGNETO SYSTEM
Italic sub-title above exploded view indicate pertaining models.
717 Engine
Drop represents a liquid product to be applied to a surface. In this case Loctite 243 to screw threads.
Exploded view assits you in identifying parts and related positions.
Dotted box contains parts of a particular model or an exploded view.
Bold face number indicates special procedure concerning this part.
Illustration number for publishing process.
12
11
5 N•m (44 lbf•in)
13
9 N•m (80 lbf•in)
Loctite 243
6
8
4
7
9
6 N•m (53 lbf•in)
5
3
14
1
4
Loctite 648
10
15
145 N•m (107 lbf•ft)
Anti-seize lubricant
2
9 N•m (80 lbf•in)
F01D4WS
03-04-1
Tightening torque nearby fastener. In this case, nut must be torqued to 145 N•m (107 lbf•ft).
CAUTION: Pay attention to torque specifications. Some of these are in lbf•in instead of lbf•ft. Use appropriate torque wrench.
Page numbering system:
03: ENGINE section
04: MAGNETO SYSTEM subsection
1: First page of this subsection
F01A0CS

TYPICAL PAGE

Sub-title with part name(s) from exploded view.

Section 06 FUEL SYSTEM
Subsection 03 (CARBURETORS)

Title indicates main procedure to be carried-out.

CARBURETOR REMOVAL

To remove carburetors from engine, proceed as follows:

Remove air vent tube support.

Unlock retaining slides holding air intake silencer base. Remove air intake silencer base from watercraft.

Remove screws holding flame arrester base support to cylinder head cover.

Unscrew base retaining screws then remove base from carburetors and move to front of watercraft.

Turn the valve to OFF position.

Service tool to be used to perform a certain procedure.

NOTE: For fuel line removal, use pliers (P/N 295 000 054).

Disconnect pulse line from fuel pump.

Disconnect fuel fuel supply line from fuel pump.

Disconnect fuel return line.

Disconnect oil injection pump cable, throttle cable and choke cable.

Title in italic indicates a particular procedure concerning a model.

XP Model Only

Remove screws **no. 6** and lock washers **no. 7** retaining carburetors.

Sub-sub-title in this case indicates that particular procedure for XP is finished, so from this point, all others models are concerned.

All Others Models

Remove 4 bolts **no. 8** and lock washers **no. 12** from rotary valve cover then move carburetors and rotary valve cover on top of engine.

NOTE: When removing rotary valve cover, pay attention that the rotary valve stay in place, other-wise it must be timed.

Remove carburetors from intake manifold.

Disconnect fuel bypass line between carburetors (twin carburetors).

Remove carburetor(s) from rotary valve cover.

DISASSEMBLY AND INSPECTION

Inspect parts for corrosion dammage (shaft, butterfly, spring, screw, check valve housing, etc.).

Diaphragm

PUMP DIAPHRAGM LEAK TEST

Sub-sub-title in capital indicates a particular testing, adjustment or repair procedure.

Using a suitable pump gauge tester, perform the following test proceeding as follows:

- Install pump gauge tester (P/N 295 000 083) on pulse nipple.
- Pump tester until it reaches 28 kPa (4 PSI).

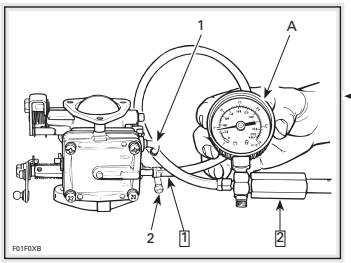


Illustration always follows text it is pertained to.

TYPICAL

"TYPICAL" mention indicates a general view which does not represent full detail.

Step 1: Install pump gauge tester to pulse nipple
Step 2: Pump tester until it reaches the desired pressure
1. Fuel outlet nipple
2. Fuel inlet nipple
A. 28 kPa (4 PSI)

Diaphragm must stand pressure for 10 seconds. If pressure drops, replace diaphragm.

Numbers in a frame are used to give a sequence to be perfomed.

Letters are used for any measures.

06-03-4

Bold numbers in the text refer to the parts shown in the exploded view at the beginning of the subsection.

Numbers are used for description of components.

F01A0BS

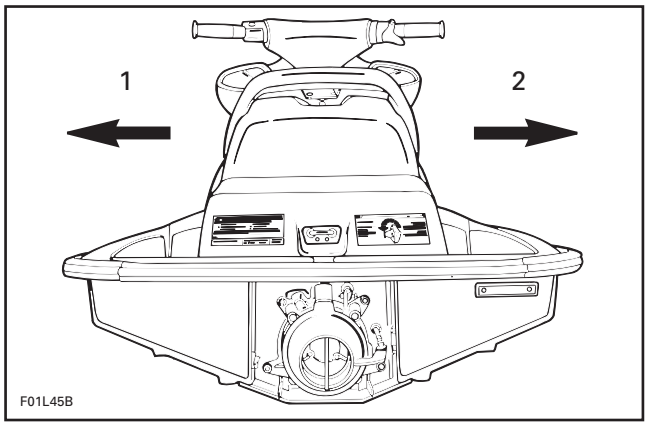
LIST OF ABBREVIATIONS USED IN THIS MANUAL

	DESCRIPTION
ADC	Analog to Digital Conversion
AC	Alternate Current
APS	Air Pressure Sensor
ATS	Air Temperature Sensor
B.U.D.S.	Bombardier Utility and Diagnostic Software
CDI	Capacitor Discharge Ignition
CPS	Crankshaft Position Sensor
CSI	Cooling System Indicator
DC	Direct Current
DESS	Digitally Encoded Security System
DI	Direct Injection
E.I.N.	Engine Identification Number
ECM	Engine Control Module
ECU	Electronic Control Unit
EPA	Environmental Protection Agency (USA)
HP	Horse Power
LED	Light Emitting Diode
MAG	Magneto
MPEM	Multi-Purpose Electronic Module
MPH	Mile Per Hour
MPI	Multi Protocol Interface
N.A.	Not Applicable
OPT	Optional
P/N	Part Number
PFD	Personal Flotation Device
PSI	Pound Per Square Inch
PTO	Power Take Off
RAVE	Rotax Adjustable Variable Exhaust
RFI	Rotax Fuel Injection
RPM	Revolution Per Minute
STD	Standard
TBD	To Be Determined
TDC	Top Dead Center
TPS	Throttle Position Sensor
VDC	Volt Direct Current
VCK	Vehicle Communication Kit
VDC	Volt Direct Current
VTS	Variable Trim System
WTS	Water Temperature Sensor

GENERAL INFORMATION

The use of RIGHT (starboard) and LEFT (port) indications in the text, always refers to driving position (when sitting on watercraft).

Besides, in the marine industry, FRONT is called BOW and REAR is called STERN.



1. Left (port)
2. Right (starboard)

The information and component/system descriptions contained in this manual are correct at time of writing. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

This *Shop Manual* uses technical terms which may be different from the ones of the *Parts Catalogs*.

When ordering parts always refer to the specific model *Parts Catalogs*.

ILLUSTRATIONS AND PROCEDURES

The illustrations show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

CAUTION: These watercraft are designed with parts dimensioned mostly in the metric system. However some components may be from the imperial system. When replacing fasteners, make sure to use only those recommended by Bombardier.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before undertaking any procedure, be sure that you have on hand all the tools required, or approved equivalents.

ENGINE EMISSIONS INFORMATION

Manufacturer's Responsibility

Beginning with 1999 model year engines, PWC manufacturers of marine engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States of America Environmental Protection Agency (EPA). An emissions control information label, showing emission levels and engine specifications, must be placed on each vehicle at the time of manufacture.

Dealer Responsibility

When performing service on all 1999 and more recent Sea-Doo watercrafts that carry an emissions control information label, adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are not to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturer's prescribed changes, such as altitude adjustments for example.

Owner Responsibility

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is not to, and should not allow anyone to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

EPA Emission Regulations

All new 1999 and more recent Sea-Doo watercrafts manufactured by Bombardier are certified to the EPA as conforming to the requirements of the regulations for the control of air pollution from new watercraft engines. This certification is contingent on certain adjustments being set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed and, whenever practicable, returned to the original intent of the design.

The responsibilities listed above are general and in no way a complete listing of the rules and regulations pertaining to the EPA requirements on exhaust emissions for marine products. For more detailed information on this subject, you may contact the following locations:

VIA U.S. POSTAL SERVICE:

Office of Mobile Sources
Engine Programs and Compliance Division
Engine Compliance Programs Group (6403J)
401 M St. NW
Washington, DC 20460

VIA EXPRESS or COURIER MAIL:

Office of Mobile Sources
Engine Programs and Compliance Division
Engine Compliance Programs Group (6403J)
501 3rd St. NW
Washington, DC 20001

EPA INTERNET WEB SITE:
http:/www.epa.gov/omswww

SELF-LOCKING FASTENERS PROCEDURE

The following describes the most common application procedures when working with self-locking fasteners.

Use a metal brush or a screwtap to clean the hole properly then use a solvent (Methyl-Chloride), let act during 30 minutes and wipe off. The solvent utilization is to ensure the adhesive works properly.

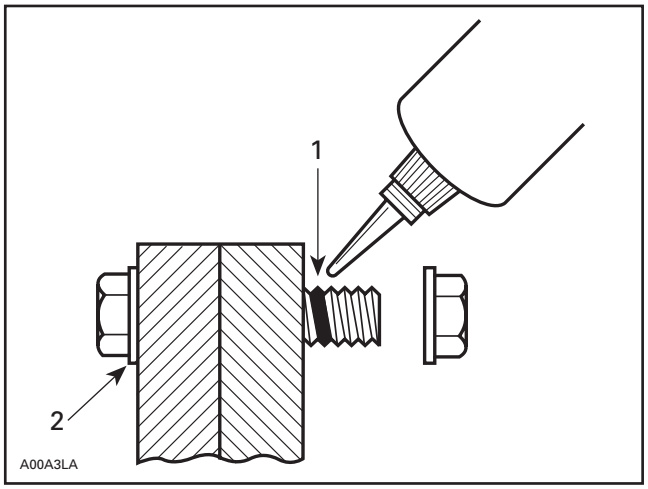
LOCTITE APPLICATION PROCEDURE

The following describes the most common application procedures when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this *Shop Manual*.

THREADLOCKER

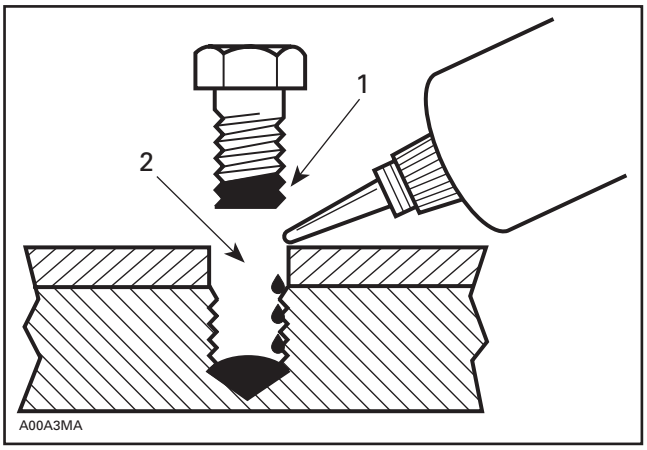
Uncovered Holes (bolts and nuts)



1. Apply here
2. Do not apply

1. Clean threads (bolt and nut) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
3. Choose proper strength Loctite threadlocker.
4. Fit bolt in the hole.
5. Apply a few drops of threadlocker at proposed tightened nut engagement area.
6. Position nut and tighten as required.

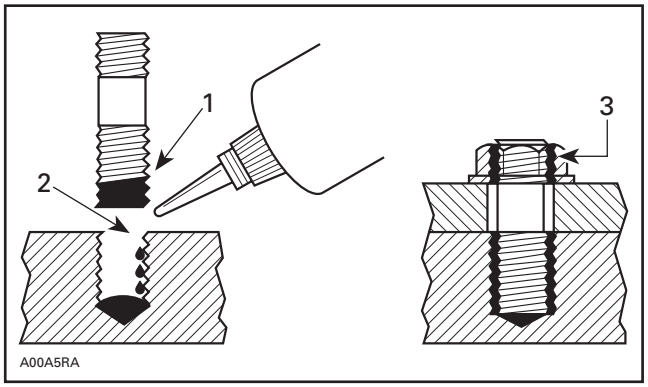
Blind Holes



1. On threads
2. On threads and at the bottom of hole

1. Clean threads (bolt and hole) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
3. Choose proper strength Loctite threadlocker.
4. Apply several drops along the threaded hole and at the bottom of the hole.
5. Apply several drops on bolt threads.
6. Tighten as required.

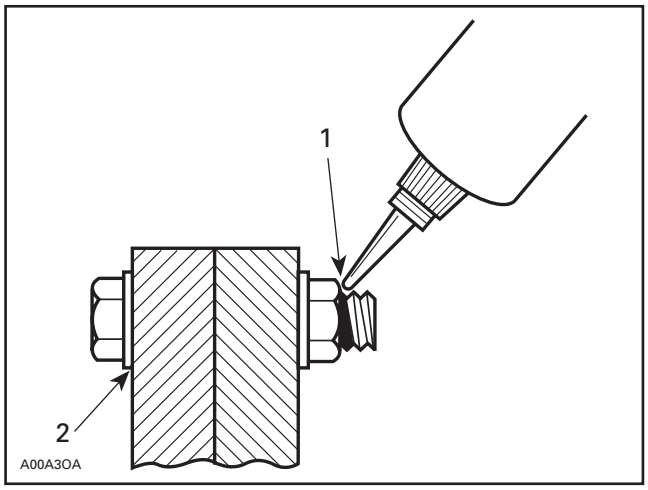
Stud in Blind Holes



1. On threads
2. On threads and in the hole
3. Onto nut threads

1. Clean threads (stud and hole) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
3. Put several drops of proper strength Loctite threadlocker on female threads and in hole.
4. Apply several drops of proper strength Loctite on stud threads.
5. Install stud.
6. Install cover, etc.
7. Apply drops of proper strength Loctite on uncovered threads.
8. Tighten nuts as required.

Preassembled Parts

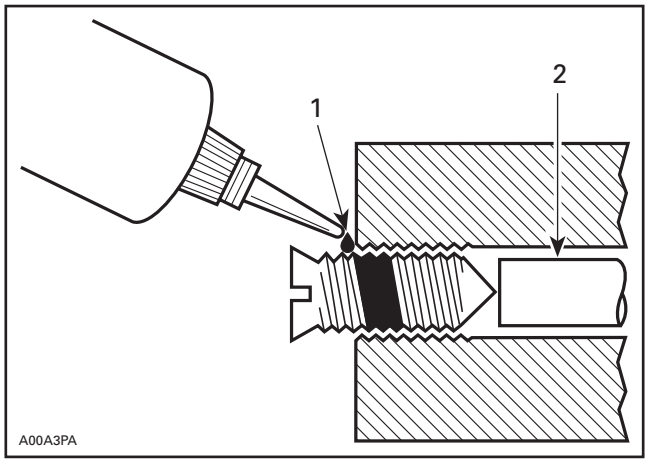


1. Apply here
2. Do not apply

1. Clean bolts and nuts with solvent.
2. Assemble components.
3. Tighten nuts.
4. Apply drops of proper strength Loctite on bolt/nut contact surfaces.
5. Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Adjusting Screw



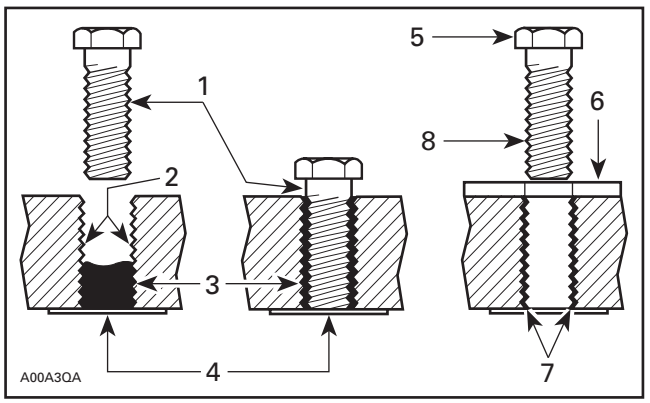
1. Apply here
2. Plunger

1. Adjust screw to proper setting.
2. Apply drops of proper strength Loctite threadlocker on screw/body contact surfaces.
3. Avoid touching metal with tip of flask.

NOTE: If it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

STRIPPED THREAD REPAIR

Stripped Threads



1. Release agent
2. Stripped threads
3. Form-A-Thread
4. Tape
5. Cleaned bolt
6. Plate
7. New threads
8. Threadlocker

Standard Thread Repair

1. Follow instructions on Loctite FORM-A-THREAD 81668 package.
2. If a plate is used to align bolt:
   a. Apply release agent on mating surfaces.
   b. Put waxed paper or similar film on the surfaces.
3. Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

Option 1: Enlarge damaged hole, then follow **Standard Thread Repair** procedure.

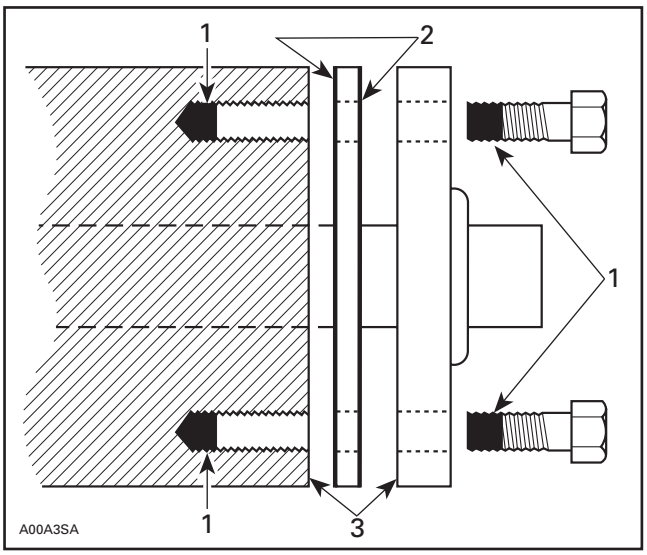
Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

Permanent Stud Installation (light duty)

1. Use a stud or thread on desired length.
2. DO NOT apply release agent on stud.
3. Do a **Standard Thread Repair**.
4. Allow to cure for 30 minutes.
5. Assemble.

GASKET COMPOUND

All Parts



1. Proper strength Loctite
2. Loctite Primer N (P/N 293 800 041) and Gasket Eliminator 518 (P/N 293 800 038) on both sides of gasket
3. Loctite Primer N only

1. Remove old gasket and other contaminants with Loctite Chisel remover (P/N 413 708 500). Use a mechanical mean if necessary.

NOTE: Avoid grinding.

2. Clean both mating surfaces with solvent.
3. Spray Loctite Primer N on both mating surfaces and on both sides of gasket. Allow to dry 1 or 2 minutes.
4. Apply GASKET ELIMINATOR 518 (P/N 293 800 038) on both sides of gasket, using a clean applicator.
5. Place gasket on mating surfaces and assemble immediately.

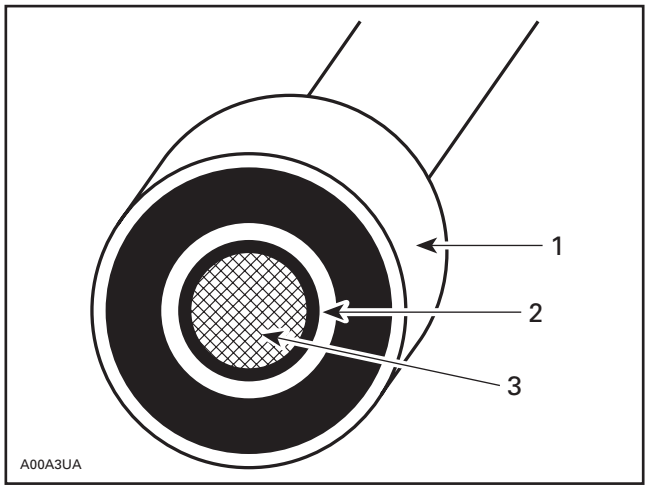
NOTE: If the cover is bolted to blind holes (above), apply proper strength Loctite in the hole and on threads. Tighten.

If holes are sunken, apply proper strength Loctite on bolt threads.

6. Tighten as usual.

MOUNTING ON SHAFT

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

Standard

1. Clean shaft external part and element internal part.
2. Apply a strip of proper strength Loctite on shaft circumference at insert or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft.

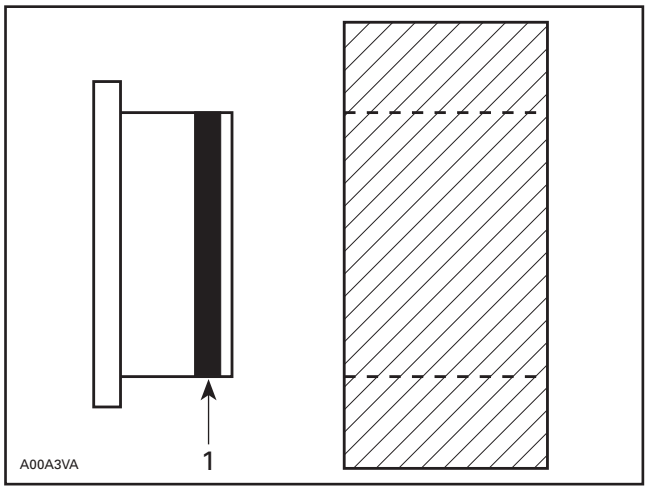
3. DO NOT use anti-seize Loctite or any similar product.
4. No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal element bore.
2. Continue to assemble as shown above.

CASE-IN COMPONENTS

Metallic Gaskets



1. Proper strength Loctite

1. Clean inner housing diameter and outer gasket diameter.
2. Spray housing and gasket with Loctite Primer N (P/N 293 800 041).
3. Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

4. Install according to standard procedure.
5. Wipe off surplus.
6. Allow it to cure for 30 minutes.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table.The table also gives the metric conversion.

N•m	FASTENER SIZE (8.8)	Lbf•**in**
1		9
2	M4	18
3		27
4	M5	35
5		44
6		53
7		62
8		71
9		80
10	M6	89
11		97
12		106
13		115
14		124
15		133
16		142
17		150
18		159
19		168

N•m	FASTENER SIZE (8.8)	Lbf•ft
20		15
21		15
22		16
23	M8	17
24		18
25		18
26		19
27		20
28		21
29		21
30		22
31		23
32		24
33		24
34		25
35		26
36		27
37		27

N•m	FASTENER SIZE (8.8)	Lbf•ft
38		28
39		29
40		30
41		30
42		31
43		32
44		32
45		33
46		34
47		35
48	M10	35
49		36
50		37
51		38
52		38
53		39
54		40
55		41
56		41
57		42
58		43
59		44
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70		52
71		52
72		53
73		54
74		55
75		55
76		56
77		57
78		58
79		58
80	M12	59
81		60
82		60

N•m	FASTENER SIZE (8.8)	Lbf•ft
83		61
84		62
85		63
86		63
87		64
88		65
89		66
90		66
91		67
92		68
93		69
94		69
95		70
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113		83
114		84
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116		86
117		86
118		87
119		88
120		89
121		89
122		90
123		91
124		91
125		92
126		93
127		94

N•m	FASTENER SIZE (8.8)	Lbf•ft
128		94
129		95
130		96
131		97
132		97
133		98
134		99
135	M14	100
136		100
137		101
138		102
139		103
140		103
141		104
142		105
143		105
144		106
145		107
146		108
147		108
148		109
149		110
150		111

TIGHTENING TORQUES FOR 8.8 GRADE BOLTS AND NUTS

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